A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, *i.e.*, the successful implements, being indicated by entries in italics in column 2.

Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., the successful implements, being indicated by entries in italics in column 2.

No.	Designation of Implements.	Use.	Special advantages or instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporters.
1	2	3	4	5	6	7	8	9	10
					PLOUGHS.				
				R a. p.					
1	E. P. plough .	Ordinary ploughing.	Light, strong and cheap.	10 8 0	Messrs. Massey & Co., Madras.	C. Benson, Esq., M.R.A.C., Deputy Director, Land Records and Agriculture (Agricultural Branch), Madras.	The Deputy Director has nothing new to note regarding these ploughs.	The demand for them has, the Deputy Director believes, languished of late	
2	Climax plough .		Light and cheap .	6 0 0					
3	B. S. plough .	Ordinary ploughing, but to greater depths than Nos. 1 and 2.	Fairly strong and cheap.	23 8 0					
4	Cotton soil plough No. 1.	Breaking up waste and clearing foul black cotton soil.	Strength and efficiency.	65 0 0			These are all valuable implements for the purpose in view.	All these ploughs were in much demand last season in Bellary, and part of Anantapur, and a large number were purchased by the ryots. This year there is a probability of a larger demand.	
5	Heavy plough—No. 1.			60 0 0	Made at Öfverums Bruk, Sweden. Imported by dealers at Bellary at prices quoted.				
6	No. 2.			60 0 0					
7	No. 12 .			75 0 0					
8	No. 16 .			70 0 0					
9	The Swedish wheeled or turn-furrow plough.	Inversion of soil.	.....	R50 to R70 according to size and strength.	N. H. Patuck, Esq., Engineer and Implement Agent, Khetawadi, Bombay; also of Messrs. Massey & Co., of Madras.	J. Mollison, Esq., Superintendent of Farms, Bombay.	.....	None in Bombay .	The Director, Department of Land Records and Agriculture, Bombay, reports as follows: "Mr. Mollison purchased a Swedish plough from Adoni in Madras and tried it on the medium black soil of the Poona Farm and on the deep black soil of the Surat Farm. On the Poona Farm it did fair work, but on the Surat Farm four pairs of powerful Gujarat bullocks were unable to draw it for any length of time, thus pointing to the difference between the black soil of Bombay and the black soil of Madras. The Swedish or any other turn-furrow plough does good work when the soil is moderately moist, and with a pair of good bullocks half an acre can then be done in a day. Mr. Mollison further remarks:— "The great objection to the Swedish plough is that the ploughman cannot begin at one side of a field and make furrow after furrow until he finishes at the other side. The field has to be ploughed in sections or laps. In the dry season, three or four pairs of bullocks at least are required, and two head-lands of considerable breadth must be left to allow the cattle room to turn. Plough cattle in the Deccan are trained to always turn away from the ploughed ground, and a

BENGAL SECRETARIAT LIBRARY

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., *the successful implements, being indicated by entries in italics in column 2*—continued.

No.	Designation of Implements.	Use.	Special advantages or Instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporters.
1	2	3	4	5	6	7	8	9	10
					PLOUGHS—*contd.*				
				R a. p.					they have to turn with a turn-furrow plough, sometimes in one direction and sometimes in another they get almost unmanagable at the end unless old and very steady. A lot of time is wasted at the ends in drawing the plough along the head lands, whilst not actually doing work. The head-lands are, at the best of irregular width, and when ploughed the work is almost certain to be badly done. As each lap is finished, a good deal of work is scamped, because as the unploughed ground between two adjacent laps gets narrow, the cattle must walk over the rough surface of the ploughed ground and then they are unable to pull straight or to advantage. It may be argued that all the objections do not apply to work done during the rains or on moist, easily-moved soil. Even if this were so, what is the good of an implement that only works well at one season? It is most important to have an implement that will work well in the fair season, because it is most advantageous that black soil should be turned up into huge clods for exposure to the sun. In a comparative trial in the fair season at Poona, the Swedish plough ploughed ⅞ths of the area respectively covered by the turn-wrest plough and a heavy Deccan plough. The Deccan plough required an extra pair of bullocks. The soil was medium black and fairly set."
10	*Swedish plough.*	.....	Efficiency in ploughing and inverting the soil, especially in breaking up grass lands.	21 10 0	Akerbunks Redshop & Co., Öfveruna, Sweden.	Director of Land Records and Agriculture, Central Provinces.	(See column 10) .	Some have been procured from Madras by land-holders in the Hoshangabad District.	The Director of Land Records and Agriculture, Central Provinces, remarks as follows:— Has continued to do very good work on the Nagpur Farm.
11	Ransome's Turnwrest plough.	Deep ploughing	.....	Made of three sizes: the cheapest being, at current rate of exchange, worth about R34 for B. T. & R36 for C. T. in England.	F. Shallis, Esq., Engineer and Implement Agent, Bombay.	J. Mollison, Esq., Superintendent of Farms, Bombay.	.....	It is not likely that it or any other turn-furrow plough will be taken up by cultivators in the Deccan, except for sugar-cane cultivation, the reason being that the indigenous plough is by no means the ineffective implement it is sometimes called. A Poona land-owner and cul-	The Director says:— "This plough is, in Mr. Mollison's opinion, better suited to the conditions of Indian agriculture than any other turn-furrow plough which he has seen or tried. It is of undoubted strength and durability. It does capital work on any kind of soil, which, in respect to moistness, is in good condition for ploughing. It can be used with as good effect as the best indigenous plough on black soil, which has become hard and fissured in the dry season. If the late rains fall in October-November, it will work up to the end of February, but not later, except in fields which have been under irrigation. The draft is less than that required for a heavy Deccan plough. Four pairs of

								tivator gave the plough a thorough trial and then ordered three direct from the manufacturers. He has since had two others made locally on the same pattern at R25 each, and arrangements are being made to have twelve made locally, which will be hired or sold to cultivators by the Agricultural Department.	bullocks in a turn-wrest plough will do equal work with six pairs of bullocks in a Deccan plough in deep cotton soil In each case huge clods are turned up, but only about ⅛th acre is done in a day. The chief advantage which the turn-wrest plough has over any other turn-furrow is that it ploughs the field in precisely the same manner as a native plough. The mould-board and share by an ingenious arrangement can easily and quickly be adjusted on one side of the plough, as it goes in one direction, and on the other side as it returns. The opening, therefore, is made along one side of the field, and furrow along side furrow is turned, until the whole field (inclusive of the head-lands, but excepting the corners) is ploughed. At each forward and backward journey of the plough, one of each pair of bullocks walks alternately on the rough ploughed ground, and on the smooth unploughed ground, and the bullocks do not get foot sore to the same extent as if yoked to an ordinary turn-furrow plough, in which case the same bullock or bullocks would continue walking on the rough ground all day, unless the ploughman took the trouble to unyoke and give the bullocks turn and turn about on the rough ground. The turn-wrest plough yoked with two pairs of bullocks ploughed the sugarcane experimental field at Manjri soon after the crop was harvested. Such land, although moist, is very difficult to plough, owing to the root stocks of the sugarcane having a firm hold of the ground. The plough did the work as effectively and as expeditiously as a native plough with five pair of bullocks. The draft of the turn-wrest plough is much lessened by the combined action of the coulter and share cutting through and dislodging the tough root stocks. The mould-board completes the dislodgment. In sugarcane cultivation, a saving in bullock power is of great importance, because the crop is a 11½ or 12 months' crop, and the field should be ready for replantation as soon as possible after harvest, because the crop can only be seasonably planted in January, February or March."
12	*Ransome's light wooden "Eagle" ploughs.*	For ploughing .	The work is done properly and the earth is broken in a perfect manner.	17 0 0	Calcutta, Bankipur, and Muzaffarpur.	Collector of Durbhanga.	.....	Not used by the natives.	
13	*Ransome's light wooden Indian ploughs.*	Ditto . .		13 0 0					
14	Shibpur wrought-iron soil-inverting plough.	Soil inverting .	Being made of wrought iron can be easily repaired. Is a cheap soil inverting plough.	7 0 0	Agricultural Department, Bengal.	J. Mollison, Esq., Superintendent of Farms, Bombay.	.....	Four reported in use in Broach last year, and of the twelve bought eight were not in actual use.	In the opinion of the Director of Agriculture, Bombay, it is too light and too frail an implement to be successfully used on the deep black soils anywhere in the Presidency, and on lighter soils the indigenous plough does quite as good work, except perhaps in Gujarat. There the ordinary country plough is more or less a toy, but it is satisfactory to note that this inferior implement is giving place in the more advanced districts to a heavier and more effective

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., the successful implements, being indicated by entries in italics in column 2—continued.

No.	Designation of Implements.	Use.	Special advantages or instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporters.
1	2	3	4	5	6	7	8	9	10
				PLOUGHS—*contd.*					
				R a. p.					
15	*Shibpur wrought-iron-soil-inverting plough.*	Soil-inverting	Being made of wrought iron can be easily repaired. Is a cheap soil-inverting plough.	7 0 0	Agricultural Department, Bengal.	Commissioner of Orissa. Agricultural Department, Bengal.	.....	.....	plough of purely indigenous pattern in comparison with which the Shibpur plough would have no chance. The District Deputy Collector, Broach, has arranged a comparative trial of the Shibpur plough at Ankleswar (Broach). No sales were effected to *bonâ fide* cultivators during the year under report. Some Shibpur ploughs were tested in the Madhupur Wards' estate. They were found too heavy for the ordinary country bullocks. From recent reports, it appears, that the Shibpur plough as reported last year, is well adapted for breaking up light soils, but is not suitable for working in stiff, low, wet lands. Mr. J. Crowdy of Darbhanga, who has, in previous years, given a favourable opinion on this plough reports that he still uses it. The Survey Commissioner and Director of Land Records and Agriculture, Bombay, who has arranged for experimental use of the plough in the Bombay Presidency since the year 1891, sends the following remarks: 'This implement is cheap, light of draft, and serviceable when the soil is moist and easily moved. It is too frail an implement to be used in the soils of the Deccan, except during the monsoon and even then cannot be used so soon after rain as a wooden indigenous implement can. It has neither the strength, nor the durability of a well-constructed Deccan plough, nor has it, in my opinion, any advantage over that implement in penetration power or otherwise. It has a better chance of being successfully introduced into Gujarat than into the Deccan, because in Gujarat, the indigenous plough in common use is by no means an effective implement.' The Deputy Collector of Broach reports, that of the 12 ploughs purchased, 4 are actually in use at present, and feels sure that the remaining ploughs will come into favour in due course, the advantages of the plough being that it works much deeper and turns over a given area of land far more expeditiously than the Gujarat plough.

										Mr. Pal Chaudhuri of Natuda, in the Nadia district, reports that the six Shibpur ploughs, which are being worked in his farm, are giving excellent results in ploughing up light soils for the first and second time. The Manager of the Dighapatia estate reports that last year the Shibpur plough was not much used on account of its being too heavy for the bullocks of the country. The Superintendent of the Purnea Jail reports that the plough worked well during the year.
16	*Baldeo plough* .	For ploughing	.....	2 0 0	Cawnpore Government Farm.	Collector of Faridpur.	The Deputy Collector in charge of the Faridpur Government estates is of opinion that, unless the breed of cattle in Bengal is improved, the Baldeo plough cannot be made use of.	15 Baldeo ploughs were used in the Faridpur Government estates.	It was at first supposed that Baldeo ploughs would do well in alluvial soil of the char lands of the district, but they proved a failure.
		Ploughing light soils.	Cheap, simple and effective. Inverts the soil.	2 8 0	Government Experimental Farm, Cawnpur.	S. M. Hadi, Esq., M.R.A.C., Assistant Director of Land Records and Agriculture, North-Western Provinces and Oudh.	Maintains the reputation it has acquired for itself.	The plough is used by a large number of well-to-do agriculturists throughout the united provinces. Other Provinces have also occasionally imported it. The plough has been adopted by certain cultivators of the Farakhabad District.	Eighteen were sold, three were given on trial, and three on hire during the year.
17	*Improved Baldeo plough,*	Ditto.	Is stronger than the old Faldeo plough (No. 16).	3 8 0			This form of the Baldeo plough is stronger, larger in size and more durable, goes deeper in the ground and inverts the soil more effectively. It ploughs half an acre in about 8 hours to a depth of 4 inches, the width of the furrow being 6½ inches.	Is gaining popularity among native cultivators. Several have been purchased by the cultivators of the Muthra District	Twenty-eight were sold and 2 were given on trial during the year.

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., the successful implements, being indicated by entries in italics in column 2—continued.

No.	Designation of Implements.	Use.	Special advantages or instructions.	Price.	Where procurable.	Name and Designation of Official Reporter	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporter.
1	2	3	4	5	6	7	8	9	10
					PLOUGHS—*concld.*				
				R a. p.					
18	*S. S. preparation plough.*	For breaking up the soil before using the ordinary native plough.	Light, good and cheap.	2 12 0	Messrs. Still and Sealy of Motihari.	Collector of Champaran.	Satisfactorily worked and appreciated.	Much used by planters and a few are sold to natives.	The Collector of Champaran states that during the year under report 142 preparation and 23 turning ploughs, 548 preparation shares and 87 shares for turning ploughs have been sold.
19	*Preparation share.*			0 12 0					
20	*Shares for turning plough.*			1 4 0					
21	*Turning plough complete.*			7 0 0					
22	*Avery's "Hindustani" plough.*	For ploughing out indigo stalks and turning over the soil.	Light, and breaks the soil easily.	11 8 0	Jessop and Company of Calcutta.	Collector of Durbhanga.	.....	Not used by the natives.	
23	*Avery's Universal "Stalk" plough.*	Ditto . .	The work is done properly, and the earth is broken in a perfect manner.	8 0 0	Calcutta, Bankipore, and Muzaffarpore.	Ditto . .	.....	Ditto.	
24	*McPair (?) patent sub-soil and general plough.*	For ploughing .	Ditto . . .	16 8 0	Ditto . .	Ditto . .	.....	Not used by the natives.	
25	*Howard's Patent D. ploughs.*	Ditto . .	Ditto . . .	42 0 0	Ditto . .	Ditto . .	.....	Ditto.	
26	*Raiyat's plough (No. 1).*	.....	.....	16 0 0	Messrs. T. E. Thomson and Company of Calcutta.	Collector of Shahabad.	.....	.....	This implement is in use in the Dumraon Farms and Raj gardens.
27	*Kaisar plough* .	Inversion of soil	Cheapness, lightness (being only 16 seers in weight) and simplicity of construction. The share can be easily removed any time and fixed again. The iron parts are made of ordinary sheet iron, so that repairs can be done by an ordinary village mistri.	6 0 0	Government Experimental Farm, Cawnpore.	S. M. Hadi, Esq., M.R. A. C., Assistant Director, Department of Land Records and Agriculture, North-Western Provinces and Oudh.	Maintains the reputation it has acquired for itself.	The plough is used by many well-to-do cultivators.	Seven were sold during the year.
28	*Watt's chain plough.*	Inversion of soil and ploughing heavy soil.	Easy draught and adaptability to the different modes of preparing soils.	7 0 0	Ditto	Ditto . .	Ditto . .	The plough is used by a large number of well-to-do agriculturists throughout	Twenty-two were sold, 10 were given on trial, and 27 on hire during the year.

								the united provinces. Other Provinces have also occasionally imported it.	
29	*Burke's and other improved ploughs.*	.....	.....	.....	.....	.....	.....	.....	The Director of Land Records and Agriculture, Punjab, reports :— "The Burke's improved plough has been tried at the Jalalabad (Mamdot) Stud Farm by horse power with very fair results, but the native agriculturists have not taken to it, and it seems to have but little advantage over their ordinary ploughs. It does not invert the soil, but this is not a desideratum here."

WINNOWING, THRESHING, AND CLEANING MACHINES, CHAFF-CUTTERS, etc.

30	Threshing machine.	.....	.....	.....	Messrs. Thomson and Mylne of Behia.	.....	.....	.....	Messrs. Thomson and Mylne report that the machine was tried on various crops with satisfactory results as to the separation of the grain from the ear and the quality of "bhoosa" produced. It effected a saving of time and labour as compared with the ordinary method of "treading out."
31	*Iron thresher*	.....	.....	.....	.....	Agricultural Department, Bengal.	.....	.....	An iron thresher made by Messrs. Burrows, Thomson and Mylne was tried by several raiyats in the Arrah district, and at the Government dairy farm at Cherat near Aligarh, in the North-Western Provinces. The result is reported to have been satisfactory.
32	*T. E. Thomson's Chaff-cutter.*	For cutting fodder	.....	45 0 0	Messrs. T. E. Thomson, & Co., of Calcutta.	Collector of Shahabad.	.....	.....	The Collector of Shahabad states that the chaff-cutter is used regularly in the Dumraon Raj gardens and farms.
33	The Behia threshing machine.	Threshing grain	The machine is composed of four sections, each section being of the shape of a wheel which is made to move round on the cut crop in order to thresh out the grain. One, two or more sections can be worked at a time according to the area of the threshing floor.	With only one section R78. With two sections R144. With three sections R198. With four sections R262.	Messrs. Thomson and Mylne of Behia, Shahabad, Bengal.	S. M. Hadi, Esq., M.R.A.C., Assistant Director, Department of Land Records and Agriculture, North-Western Provinces and Oudh.	(See column 10)	Not yet used by native agriculturists.	Trials with this machine were made at the Government dairy farm, Cherat, Aligarh, and the Cawnpore Experimental Farm. At Cherat it was tried with a crop of paddy of the fine variety called nárangi. Three sections of the machine were worked at a time with one pair of buffaloes. In an hour 308lbs of *dhan* were obtained from 1,200lbs. of paddy. Employing two pairs of buffaloes at the same time to tread down an equal weight of paddy by the ordinary native methods, 318lbs. of *dhan* were obtained from the paddy in one hour and 35 minutes. The *dhan* threshed by the Behia thresher was quite free from all kinds of dirt, and none of it was left in the straw. The financial result was distinctly in

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., *successful implements, being indicated by entries in italics in column 2*—continued.

No.	Designation of Implements.	Use.	Special advantages or instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporters.
1	2	3	4	5	6	7	8	9	10
				R a. p.					
									favour of the Behia thresher which costs nearly one anna and nine pies to thresh 1,000lbs. of paddy, while the cost of threshing the same quantity by the ordinary method was not less than two annas and nine pies. In the past *rabi* harvest a trial was made at Cawnpore by the Superintendent of the Government Experimental Farm with wheat sheaves Only two sections of the machine were worked together at a time, the other two sections received at the farm having been called back by the makers. Two lots of wheat sheaves of 1,394lbs. each were taken, one was trodden by two pairs of bullocks in the ordinary way, and the other worked by the machine with one pair of bullocks, the arrangement of toothed plates being the same as was kept when testing the work of the machine in the case of paddy. By the former method, the work was completed in 26 hours and by the latter in 30 hours, the straw obtained by the former method being finer. As regards the separation of grain, there was nothing special in favour of either method. The treading under bullocks gave more grain, but that was due to the sheaves belonging to a better field. The machine could have probably finished the work more quickly had there been three sections at work, as in the case of the paddy. It was intended to try the machine with a larger quantity of sheaves, and with the teeth turned outwards, but before this could be arranged for, the makers pressed the department for a return of the machine and took it back for trial elsewhere. Its trial with wheat sheaves at the Cawnpore Farm was therefore incomplete, and the results inconclusive. Two more trials were made with the sheaves of the Canadian and Cape oats ; 448lbs. of the former and 804lbs. of the latter being threshed, respectively, in the course of 10 and 23 hours. In the latter case, the straw was reduced to the desirable standard of fineness, but in the former it was not, as the experiment had to be brought to a close abruptly in order to return the thresher to the makers.

34	*Dell's Winnower*	Winnowing grain	Winnowing and cleaning threshed grain by hand-power. It requires only two men to work it, one drives the motive wheel and the other feeds the machine.	265 0 0	Messrs. Dell & Co., Mark Lane, London.	S. M. Hadi, Esq., M.R. A.C., Assistant Director, Department of Land Records and Agriculture, North-Western Provinces and Oudh.	Works very easy indeed, and completely separates the chaff from the grain.	Not used by natives in these provinces, except by certain owners of corn grinding mills.	In a trial made at the Cawnpore Farm this winnower was found to winnow 60 seers of mixed chaff and grain in 12 minutes.
			Winnowing and cleaning threshed grain.			Director of Land Records and Agriculture, Central Provinces.	(See column 10)	Used by grain export agents, but not by cultivators.	Has continued to do very good work on the Nagpur Farm.
35	*R. Hunt's kibbling machine.*	Crushing grain of all sorts.	Lightness, simplicity and rapidity of work, and economy of labour.	35 0 0	Messrs. R. Hunt & Co., Earls' Colne, England, and Government Farm, Cawnpore.	S. M. Hadi, Esq., M.R.A.C., Assistant Director of Land Records and Agriculture, North-Western Provinces and Oudh.	Maintains its reputation.	Is used by many well-to-do natives throughout the North-Western Provinces; other provinces have also indented for some.	Sixteen were sold during the year.
36	*Nahan kibbling machine.*	Kibbling all sorts of grain.	These kibblers appear to be mere imitations of the R. Hunt's kibbler. They are of three different sizes.	No. 1, R25 „ 2, „ 20 „ 3, „ 10	Sirmoor Factory, Nahan, near Umballa, and Government Farm, Cawnpore.	Ditto.	The machine is inferior in workmanship to the R. Hunt kibbler, of which it is an imitation.	The cheapness of these machines sometimes induces natives to purchase them.	Three were sold during the year.
37	*R. Hunt's Chaff cutter "The Simplex."*	Chopping Fodder.	Economy of labour, efficiency and durability.	35 0 0	R. Hunt & Co., Earls' Colne, England, and Government Farm, Cawnpore.	Ditto.	Maintains its reputation.	Is used by many people in the North-Western Provinces.	Nine were sold during the year.
38	*Mayforth's Hand-thresher.*	...	Cheapness and rapidity in threshing wheat.	127 6 0	Mayforth & Co. of Frankfort on Maine, Germany	Director of Land Records and Agriculture, Central Provinces.	(See column 10).	One was purchased for use in the Hoshangabad District, but the non-crushing of the straw is considered by the people a great defect.	Has continued to do very good work on the Nagpur Farm.

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., *the successful implements, being indicated by entries in italics in column 2*—continued.

No.	Designation of Implements.	Use.	Special advantages or instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporters.
1	2	3	4	5	6	7	8	9	10
					WATER-LIFTS, CHAIN-PUMPS, BUCKETS, etc.				
39	See-saw water-lift.		Claims economy of labour and efficiency.	R. a. p. 30 0 0 to 100 0 0 (a)	M. R. Ry. C. K. Subba Row, Saidapet, Madras.	Committee appointed for trial of water-lifts in Madras Board's Proceedings, dated 23rd August 1895, No. 266.	This lift gave remarkably good results but the design cannot as yet be regarded as having reached its limit of perfectibility. Its merits mainly lie in utilizing the force exerted by the bullock and driver in ascending an inclined plane. It is in its essence a picottah in which one bullock, by its mere weight does the work of several men. As the length of the oscillating platform must be limited by considerations of weight and cost, the design is not adapted for wells in which the water is more than 30 feet below the ground level.		They are much more efficient than the single Mhote and whilst they, in common with the double Mhote cause much less wear and tear on the bullocks employed, it would require more skill to erect and

40	Stoney's water-lift.	Raising water.	Automatic tilting buckets.	.....	E. W. Stoney, Esq., Chief Engineer, Madras Railway Company.	Ditto . .	It is as suitable for use with the ordinary country lift as with a whim, and, as there is none of the leakage which is inevitable with buckets made of leather, or fitted with valves, its superiority over leather or valve buckets becomes greater as the depth of the well increases. The lift taken as a whole gave good results on trial and might have been worked with a much smaller bullock.		keep them in working order than is usually available in up-country villages, and to enable the village blacksmiths to do this work, their training would have to be improved.
41	Sultan water-lift.		Self-emptying buckets, bullocks worked on the flat.	125 0 0	Messrs. Sultan & Co., Madras.	C. Benson, Esq., M.R.A.C., Deputy Director, Land Records and Agriculture (Agricultural Branch), Madras.	The draught is far too heavy for ordinary bullocks.	Is being tried by a number of persons.	
42	Baldeo balti or water-lift.	Lifting water from tank or canal.	The lift consists of two galvanized iron troughs, each having a valve at the bottom opening upwards. They are hinged on a wooden beam fixed on the ground at the discharging level and are raised and let down alternately by means of a system of pulleys and ropes. Only one bullock is required to work the lift, and it has to go round and round without ever having to reverse its motion.	50 0 0	Government Farm, Cawnpore.	S. M. Hadi, Esq., M.R.A.C., Assistant Director, Department of Land Records and Agriculture, North-Western Provinces and Oudh.	Is a simple and ingenious contrivance for raising water from a tank or canal for irrigation purposes.	One was sold to a Zamindar of Aligarh in 1893; one was supplied to Manager, Court of Wards estates, Sultanpur (Oudh), last year, and one has been sold to the Charkhari State (Bundelkhand) this year.	Some mechanical advantage has been gained by effecting an improvement recently in the arrangement of ropes, whereby the strain on the bullock is somewhat reduced.

(a) According to materials used.

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i. e, the successful implements, being indicated by entries in italics in column 2—continued

No	Designation of Implements	Use.	Special advantages or instructions	Price	Where procurable	Name and Designation of Official Reporter	Opinion	Extent to which used by native Agriculturists	Remarks by Official Reporters
1	2	3	4	5	6	7	8	9	10
			WATER-LIFTS, CHAIN PUMPS, BUCKETS, etc.						
43	*Cawnpore Chain Pump*	Lifting water from depths ranging from 5 to 32 feet	Very efficient and useful	From R40 to R65 according to the length of the pipe	Government Farm Cawnpore.	S M Hadi, Esq, M R A C, Assistant Director, Department of Land Records and Agriculture North Western Provinces and Oudh.	Maintains the well deserved reputation it has acquired Is an excellent contrivance for lifting water from depths not exceeding 26 feet	Is used by many natives of the North Western Provinces, and has also been indented for from other provinces	11 were sold 1 was given on trial and 3 on hire during the year
44	*Improved Cawnpore double pump*	Lifting water from canal or tank	Two Cawnpore 5-feet chain pumps of 4½ inches diameter are worked by means of gearing, and one or two bullocks are required to work them The lift is admirably suited for irrigating large areas from tank or canal.	250 0 0	Government Experimental Farm, Cawnpore	Ditto.	Has proved to be an excellent lift for raising water from a depth of 3 or 4 feet	The heavy cost is against its sale	
45	Driving gear for chain pump		A wooden driving wheel and a wrought-iron pinion are used in place of the expensive cast iron wheels and other parts hitherto supplied.	90 0 0	Ferozepore (locally made)	Rai Bahadur Maya Das, Extra Assistant Commissioner, Manager Mamdot Estate and Vice-President District Board	Better than the iron driving gear, because easily made and repaired by country blacksmiths and carpenters, but the chain pump nevertheless often gets out of order	Not yet tried by ordinary cultivators	The Director of Land Records and Agriculture, Punjab remarks — "This gear was devised by Mr E B Francis when officiating as Director of Land Records and Agriculture, and has been successfully built and put in use at the Mamdot Estate Farm at Jalalabad The discharge of water is good and the draught very light but the rattle of the iron discs in the pipe of the pump, frightened some of the mares used to work the gear, and the ordinary Persian wheel was preferred An improved pattern is about to be tried at a small experimental farm now being started by the District Board"
46	Roller bearings for Persian wheel axle	To reduce friction	Used at the two ends of the horizontal axles of the driving wheel which carries the pots.	14 0 0	Ditto		Greatly reduces the labour of working the wheels	Not yet adopted by ordinary cultivators	The Director of Agriculture Punjab, says — "These roller bearings are made of brass castings. They are a real improvement and open to no objection But ordinary cultivators will grudge even this small outlay to save labour.'

				R a. p.					
47	The Poona Iron-sugar mill.	.....	.....	90 0 0 to 125 0 0 (according to size).	Chiefly of Mr. Naryan Tukaram, Karanjkar, Somvarpet, and of Mr. Ramchand, Bhaichand, Bhavanipet, Poona.	Director, Department of Land Records and Agriculture, Bombay.	.....	Largely used. Exported to distant places in India.	At present there are three factories where these mills are manufactured and sold, and a shop owned by a Bombay manufacturer. There is a general complaint that the trade in these mills is dwindling, owing probably to a sufficient number of mills having hitherto been sold, with the consequence that some are now lying in stock awaiting demand. As reported last year, the big three rollered mill (weighing about 20 maunds and price R125—115) commands the largest sale of all. Bigger sizes (weight up to 30 maunds and price up to R250) are sometimes manufactured to meet demand from a few occasional customers.
48	18-inch Hand Centrifugal machine.	For refining sugar.	.....	250 0 0	Messrs. Thomson and Mylne, Behia, Bengal.	J. Mollison, Esq., Superintendent of Farms, Bombay.	.....	.....	It separates the treacle from the crystalline sugar by centrifugal force. A drum revolves at a high speed inside an outer shell. The speed is sufficient to throw the sugar and molasses against the perforated sides of the drum. The treacle is forced through the minute perforations and the sugar remains. By sprinkling with water, the sugar can be further purified, the last of the treacle being thus conveyed away. The treacle drains to the bottom of the shell and flows through a hole, and may be collected in a vessel set under the machine. When the sugar is seen to be of a clear white colour, the machine should be stopped, the sugar removed, and the machine re-charged. It takes about 5 minutes to separate the treacle thoroughly from the sugar. A trial was given this machine on the Manjri farm, but the trial was not full, as the machine was received when a considerable portion of the sugar-cane crop was harvested, and as the machine was an old one. To separate the treacle from the sugar, the best results were obtained when the sugar layer against the sides of the drum was ½ inch to ¾ inch thick. When a larger charge of semi-liquid gúl than what represented this thickness of sugar was put on the drum, the sugar could not, without much extra work, be quite freed from treacle by washing; and if more water than is necessary is sprinkled into the drum, it dissolves part of the crystalline sugar and carries it as well as the treacle away through the perforations. The trials were not complete enough to determine at what stage the boiling of the juice should stop in order to give the best results. It was clear that the boiling should not continue as long as is necessary to produce solid gúl (crude sugar). It must stop at an earlier stage and the proper stage has yet to be determined.

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less market success, the latter, i.e., the successful implements, being indicated by entries in italics in column 2—continued.

No	Designation of Implements.	Use	Special advantages or instructions	Price	Where procurable	Name and Designation of Official Reporter	Opinion.	Extent to which used by native Agricultural	Remarks by Official Reporters
1	2	3	4	5	6	7	8	9	10
				BONE-CRUSHERS, SUGAR AND FLOUR MILLS, ETC.—*contd.*					
49	Shank's Sugar Mill.	Crushing sugar-cane	Economy and efficiency	Varying according to make.	Messrs. Gordon Woodroffe & Co Agents, Madras	C. Benson, Esq., M R A C, Deputy Director Land Records and Agriculture (Agricultural Branch), Madras	On these machines there is nothing to add to previous reports.	..	
50	Massey's Sugar Mill			140 0 0	Messrs Massey & Co, Madras				
51	*Renwick's patent Behia pattern Sugarcane Mill*	For crushing sugar-cane.	Effective and cheap .	35 0 0 to 80 0 0	Renwick and Company, Rajshahi.	Collector of Purnea.	Works well	More largely used than Thompson and Mylne's sugarcane mills.	These mills are generally taken on hire for the season.
		Ditto . .	.. ...	.. . .	Ditto . .	Presidency Commissioner	..	Used extensively in the Kustia and Meherpur subdivisions in the Nadia district.	These are let out on hire by Messrs Renwick and Co and Mr Sheriff of Jorada.
52	Behia Sugarcane-Mills.	Cane crushing .	Economy and efficiency	50 0 0 to 140 0 0 (Varying according to make)	Messrs Thomson and Mylne of Behia and Local Agents	Assistant Collector, Jerruck Division, Karachi.	.....	..	The Director of Agriculture, Bombay, says — "The Assistant Collector reports that 17 mills were working during the year, and that they were in constant use."
		Crushing sugar-cane				C Benson, Esq., M R A C., Deputy Director, Land Records and Agriculture (Agricultural Branch), Madras.	On this machine there is nothing to add to previous reports.		
53	*Behia Sugarcane Mills.*	.....	.. ...	.....	.....		.. ...		The Director of Land Records and Agriculture, Punjab, remarks as follows — "Driving Old Kohlu out of use in the Rohtak District." "In general use, and it is thoroughly appreciated in the "Hoshiarpur District" "Continues to be used successfully, and is liked in the "Lahore District"

			Very effective .	80 0 0 to 100 0 0	Messrs Thomson and Mylne of Behia.	Collector of Purnea	Works well .	Not very largely used on account of price	These mills are generally taken on hire for the season
			Juice can be extracted in a short time with less labour and expense	90 0 0	Ditto .	Collector of Chittagong.	This is a very useful machine	Used to a small extent by native agriculturists.	This mill is used by a majority of the Court of Wards' tenants in the Mirkasarai jurisdiction, but the local wooden mills, which are always cheap, are generally used in the other parts of this district We are trying to induce the native agriculturists to use the machine
			Economy and efficiency.	50 0 0 to 140 0 0	Ditto . .	Collector of Champarun	.. .		The Collector states that these mills are hired out by Mr Coffin of the Sathi Factory to the raiyats
54	*Behia Sugar cane Mill*	For crushing sugarcane			...	Agricultural Department, Bengal.			The Behia sugarcane mills continued to be used by the raiyats of the Maldwar Ward's estate in Dinajpur with success In the Sankerpur Ward's estate also, the Behia sugarcane mills are greatly used by the raiyats A special report on the iron roller sugar mills used in these provinces was submitted by the Bengal Agricultural Department during the year
55	*Behia Sugar cane Mill (three rollers)*	Ditto . .	.....		.. .	Commissioner of Orissa	. .		The Commissioner of Orissa states that the mill was tested in the Madhupur Ward's estate in Cuttack and found useful, and was much appreciated by the raiyats
56	*Iron Roller Sugar Mill*— (1) three rollers (2) two rollers		Efficiency in the extraction of cane-juice and improvement in quality of syrup	128 0 0 50 0 0	Messrs. Thomson & Co., Behia.	Director of Land Records and Agriculture, Central Provinces	(See column 10)	Established in one district (Betul) and coming into use in another (Chanda)	Have continued to do very good work on the Nagpur Farm
57	*Rogers Steel Roller Mill.*			95 0 0	A Rogers, Esq, Muzaffarpore Tirhoot, Bengal			One purchased by a landlord of the Bhandara District and much appreciated	
58	*Corn Crusher*	For grinding corn		60 0 0	Messrs T E Thomson & Co., of Calcutta	Collector of Shahabad	.	..	The Collector of Shahabad states that the corn crusher is used regularly in the Dumraon Raj gardens and farms
59	Aebi's Flour Mill	Making flour	Grinding wheat into flour by steam power In the course of grinding the grain goes through the following five processes — 1 It is passed through two sets of steel	Francs 1,150	Fritz Marti Parm (France)	S M Hadi, Esq M R A C Assistant Director Department of Land Records and Agriculture, North Western Provinces and Oudh	(See column 10)	Not used by natives	Several trials have been made and better results obtained since the mill was reported on last year The substitution of a larger strap pulley and of new sieves made of perforated brass and iron sheets has greatly improved the working of the machine In the last trial when it was worked with an 8-horse power engine, at a steam pressure of 45—50lb per square inch, 2½ maunds of wheat were ground in 1 hour and 20 minutes and the following products were obtained—

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., the successful implements, being indicated by entries in italics in column 2—continued.

No.	Designation of Implements.	Use.	Special advantages or instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	REMARKS BY OFFICIAL REPORTERS.
1	2	3	4	5	6	7	8	9	10

BONE-CRUSHERS, SUGAR AND FLOUR MILLS, ETC.,—*contd.*

			discs with pegs, and is then brushed out through a sieve. This sieve is to cleanse the grain of dirt. The grain now falls to the ground, and from there has to be removed to the hopper of process No. 3. 2. It is freed from the dirt by an exhaust fan working in connection with the above. 3. It being cleaned now passes through steel rollers which crush the grain preparatory to its grinding. 4. The crushed grain then passes between a pair of 9" steel discs which reduces it to flour.	*R a. p.*					

	Mds	s.	ch.
(1) Very fine flour (*Maida*) .	0	6	9
(2) Fine flour (*ata*) . .	0	17	14
(3) Ordinary flour (*ata*) .	1	6	8
(4) „ *Suji* (semolino) .	0	8	0
(5) Coarse „ (Do.) .	0	16	14
(6) Bran	0	2	11
Total .	2	18	8
Loss .	0	1	8
	2	20	0

The quality of all the products was very fair, except that of No. 5 which was poor, and whose market value was not considered to be higher than that of wheat. The disadvantages which it has not been found possible to overcome are :—

(1) That when the wheat is ground, first, a very large quantity of coarse kibbled grain (*dalia*) comes out of the outlet intended for the bran. The *dalia* being in itself unfit for making bread has to be passed over and over again through the steel rollers and steel discs in order to be ultimately reduced to flour.

2. That in course of the above process a high percentage of bran is ground fine, and its fine particles get mixed with the various products, specially with numbers 4 and 5, whose quality is thereby rendered somewhat poor.

The mill cannot be pronounced thoroughly efficient until it is found possible to remove these defects completely.

Returning to the results of the trial mentioned above, it will appear that the mill is at present capable of grinding 22½ maunds of grain in a day of 12 hours,

			5. The flour thus made now falls into a box of four compartments with sieves and a revolving brush, which effects the sorting of the flour into different grades.						the cost of working the mill with an engine being R6 as per detail below :— R a. p. 1. Wages of Engine driver . 0 8 0 2. „ of Fireman . . 0 3 0 3. „ of Mistri . . 0 8 0 4. „ of 2 Beldars . . . 0 5 0 5. Coal 5 mds at 10 a. per md. . 3 2 0 6. Oil, jute, tallow, etc. . 1 6 0 Total . . 6 0 0 The financial result of the trial is as follows :— R a p. Market value of the above products 8 12 6 *Deduct*— Cost of 2½ mds of wheat R a. p at 13 seers the rupee . 7 11 0 Cost of working the mill for 1 hour and 20 minutes . . 0 10 8 8 5 8 Difference [profit] 0 6 10
60	Baldeo Flour Mill	Grinding corn .	Economy of time and labour ; also efficiency.	60 0 0	Government Farm, Cawnpore.	S. M. Hadi, Esq., Assistant Director of Land Records and Agriculture, North-Western Provinces and Oudh.	Appears to be a good and simple contrivance for grinding cereals into flour and hibbling pulses for dal.	Not yet introduced among natives.	against which has to be set off the depreciation of machinery. It is, however, pretty clear that even in its present state it is not uneconomical to use the mill for grinding wheat. In a trial held by me five seers of wheat were ground in 35 minutes by three labourers, two of whom worked at a time, and were relieved at intervals by the third. There appears to be room for some improvement in the mill.

HOES, HARROWS, GRUBBERS.

61	*American hand-hoes.*	.....	.....	.....	.....	Agricultural Department, Bengal.	— .	... —	Babu Jnanananda Chakraburti of Magura, District Jessore, who was supplied with an American hand-hoe by the Bengal Agricultural Department in 1894, on payment of the price of R18-12, reports that he found the hoe very useful, especially in the cultivation of potato and mulberry, and that it is well worth the price.
62	Drills . .	For sowing indigo seed.	.....	24 0 0 to 40 0 0	Made in factories	Collector of Darbhanga.	.....	Not used by native cultivators.	

A List of Agricultural Implements and Machines which have been tested in India during the year ended 30th September 1895, and of those in use which are reported to have met with more or less marked success, the latter, i.e., the successful implements, being indicated by entries in italics in column 2—concluded.

No.	Designation of Implements.	Use.	Special advantage or Instructions.	Price.	Where procurable.	Name and Designation of Official Reporter.	Opinion.	Extent to which used by native Agriculturists.	Remarks by Official Reporters.
1	2	3	4	5	6	7	8	9	10
					MISCELLANEOUS—*contd.*				
				R a. p.					
70	*The Windsor separator.*	Cream separating	The cream can be separated from the milk immediately after the milk is drawn.	450 0 0	N. H. Patuck, 10th Lane, Khetawady, Bombay.	Syad Mahomed Hadi, Esq., M. R.A.C., Assistant Director of Land Records and Agriculture, North-Western Provinces and Oudh.	The machine is strong and well made and of great use in hot climate. Has continued to give satisfaction at the Cherat Farm.	Not used by natives .	The remarks made regarding No. 74 apply to this machine as well. It separates 4½ maunds of milk per hour.
71	*Victoria Churn*	Used for churning cream or whole milk.	Complete separation of butter from butter milk without either being touched by the hand.	60 0 0	Dairy Supply Co., Museum Street, London.	Ditto .	Very durable and perfectly efficient.	Used by R. C. Dutt, Lake Dairy, Naini-Tal.	Is a very useful churn for ordinary purposes.
72	*Cunningham butter worker.*	Used for separating water from butter.	Butter can be separated from water without being touched with the hands.	50 0 0	Ditto .	Ditto .	It is a simple but a very useful machine.	Ditto . .	10lbs. of butter can be worked at a time.
73	*Set of cheese-making apparatus—* (a) *Cheese tube.* (b) *Do. press.* (c) *Curd milk.*	Cheese making .	Manufacture of European cheese in India.	300 0 0	Ditto .	Ditto .	The machines are durable and well made and make fairly good cheese.	Ditto . .	This set of appliances has been made use of only occasionally, as cheese-making has hitherto proved to be unsuccessful, owing to difficulty of high temperature of the country, and has therefore been done on a small scale.
74	Babcock's milk tester.	Testing purity of milk.	Simplicity and usefulness.	20 0 0	Ditto .	Ditto .	(See column 10)	.....	Mr. Keventer, Dairy Expert and Lessee, Government Dairy Farm, Cherat, reports that he prefers this instrument to all others he has used before for testing quality of milk as it gives more accurate results and can be used by natives of ordinary intelligence.

G. I. C. P. O.—No. 883 D. R. & A.—3-3-96—890—H. R.